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STATE OF ALASKA
Walter J. Hickel, Governor

ANNUAL REPORT OF PROGRESS, 1967 - 1968

FEDERAL AID IN FISH RESTORATION PROJECT F-5-R-9

SPORT FISH INVESTIGATIONS OF ALASKA

ALASKA DEPARTMENT OF FISH AND GAME
Augie Reetz, Commissioner

Alex H. McRea, Director
Division of Sport Fish

Louis S. Bandirola, Coordinator

INTRODUCTION

This report of progress consists of findings and work accomplished under the State of Alaska Federal Aid in Fish Restoration Project F-5-R-9, "Sport Fish Investigations of Alaska."

The project during this reporting period was composed of 21 separate studies. Of these, seven jobs continued the inventorying and cataloging of the numerous waters, providing a comprehensive index of the State's recreational waters. Nine jobs accomplished special studies involving Dolly Varden, grayling, silver salmon, king salmon and sheefish, among others. The remaining five jobs are designed to accomplish creel census, migration, access and silver salmon egg-take studies. The egg-take study, Job 7-F, was inactive because egg-takes were accomplished under other projects.

Special reports on specific phases of the Dolly Varden Life History Study have been published in the Department's Research Report series.

The information gathered from all of these studies provides the background necessary for better management and assists in development of future investigational studies.

The subject matter contained within these reports is often fragmentary in nature. The findings may not be conclusive and the interpretations contained therein are subject to re-evaluation as the work progresses.

RESEARCH PROJECT SEGMENT

STATE: ALASKA

Name: Sport Fish Investigations of Alaska.

Project No.: F-5-R-9

Title: Investigation of the Fish Populations in the Chena River.

Job No.: 15-B

Period Covered: July 1, 1967 to September 1, 1967.

ABSTRACT

The study area is described and the construction and efficiency of various sampling techniques are discussed.

Arctic grayling *Thymallus arcticus*, round whitefish *Prosopium cylindraceum*, northern sucker *Catostomus catostomus*, and northern pike *Esox lucius*, were the most frequently encountered fish.

Observations were made on king salmon *Oncorhynchus tshawytscha*, chum salmon *O. keta*, and grayling movements.

Age, growth and sex composition of grayling was determined. Age and growth data of whitefish were analyzed for population characteristics.

A creel census program was initiated to determine the present sport fishery of Chena River game fish. An estimated 12,885 angler days of sport fishing occurred from April 10 to August 11 on the entire Chena River and Badger Slough area.

RECOMMENDATIONS

Incorporate the information gained and the techniques developed in this study into an extensive pre-impoundment study of the Chena River fish with emphasis on the following aspects:

1. Locate spawning grounds of northern pike and grayling in relation to the proposed reservoir.
2. Determine intrastream movements of grayling throughout the year.
3. Select sampling areas for estimating relative abundance of grayling.
4. Further determine species and size selectivity of the A.C. boom shocker.
5. Continue the creel census program on the Chena River.
6. Obtain additional information on the age, growth and sex of the whitefish.

OBJECTIVES

1. Become familiar with the Chena River watershed and test various methods of sampling the fish populations.

2. Establish techniques for determining the following population dynamics of the fish in the Chena River:

   (a) Species composition

   (b) Age and sex composition of grayling, pike and whitefish

   (c) Trends and extent of natural movements

   (d) Spawning locations

3. Determine the present utilization of the recreational fishery on the Chena River.

TECHNIQUES USED

Familiarization with the Chena River was by communication with personnel from the Alaska Water Laboratory, United States Geological Survey and the Aero-Medical Laboratory at Fort Wainwright. Kogl's thesis on salmon spawning in the Chena River (1965), surveys by the Fish and Wildlife Service, and miscellaneous papers provided basic background information.

In-field familiarization was gained by making three one-hour flights in a PA-18 aircraft, one canoe trip from Van Curler's bar (river mile 120) to the Bailey Bridge site (river mile 63), and approximately 150 hours of riverboat travel.

The river was arbitrarily sectioned off into 16 areas bounded by natural or man-made landmarks. Figure 1 shows these areas and the location of the impoundment proposed by the U.S. Army Corps of Engineers for the river.

Fish were sampled by hook and line fishing through the ice from the first week in March until ice breakup in mid-April. Fish were also captured by seine in the backwater sloughs and areas of slow water.

Initial efforts to capture fish by electro-shocking in the Chena River were made using an alternate polarity electrode attached to a back-pack shocker. The shocker was capable of delivering direct or alternating current and was powered by a "Tiny Tiger" generator delivering 110 volts and 300 watts. The unit was controlled by a transformer having a variable output of up to 300 volts. The A.C. wiring of the unit consisted of two 4-foot No. 9 braided copper wires attached between two 5-foot wooden handles. A pressure switch on the handle supplied power to the electrodes. Operation of the unit required two men. One carried the back-pack unit and held the electrodes under water. The other started the unit and adjusted the transformer until the generator could be noticeably heard "working" (this usually occurred at 225 - 250 volts), or until immobilized fish appeared. The operator would release the switch when fish were turned over, and the fish were netted by the second man. The cutting of the power to the electrode was not only a safety factor for the operators, but also allowed the fish to be taken with the minimum amount of exposure to the electrical current. Both operators of this unit wore rubber waders and gloves for additional safety.

Two boat-mounted electro-fishing units were constructed. The power source for these units was a Homelite generator capable of delivering 115 to

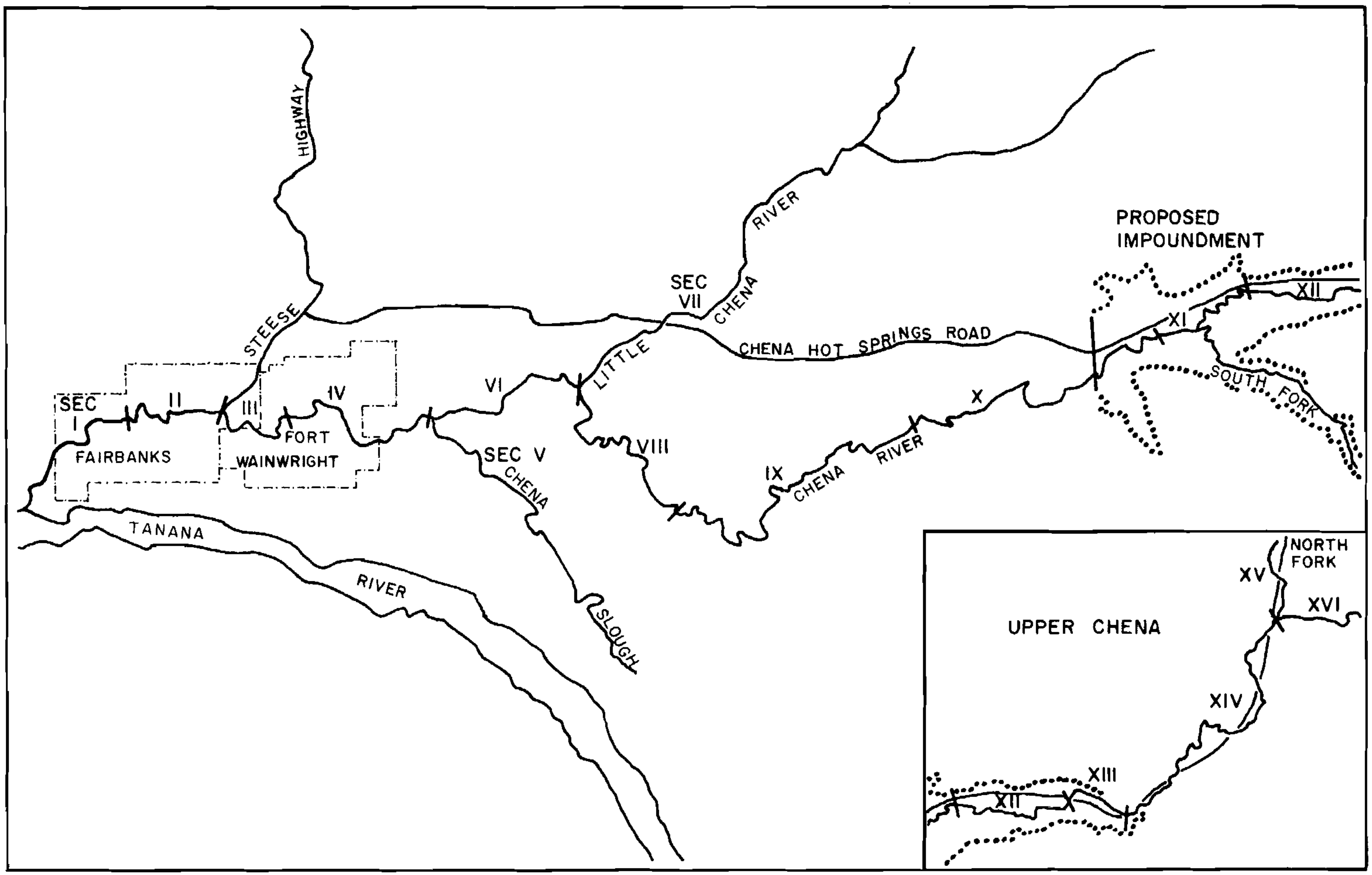

FIGURE I. CHENA RIVER STUDY SECTIONS.

200 volts - A.C. A Coffelt A.C.-D.C. pulsating unit delivering up to 280 volts and 10 amps was used as a control unit. The unit delivered A.C., D.C., or pulsating D.C. up to frequency of 100 pulses per second. A "deadman" switch was wired between the power source and the electrodes so that the power could be instantly cut by the boat operator.

The first boat-mounted unit constructed (Figure 2) was a pulsed D.C. system. The anode was a piece of 3/8-inch copper tubing, 24 inches long, bent into a hoop. The anode was attached to an 8-foot wooden pole and held in the water in front of the boat. The negative pole was wired to the aluminum boat, thus making the boat the cathrode.

The design for the alternating current boat-mounted unit is shown in Figure 2. The boom was constructed of two 10-foot wooden poles extended 6 feet in front of the boat, with a 16-foot wooden crosspiece mounted on the end of the side poles. The boom members were tied together with heavy rubber inner tube strips. This gave flexibility to the boom and reduced the chance of damage from undue stresses. The original wiring for the booms consisted of two 25-foot sections of No. 9 insulated wire running along one side arm of the boom and extending along the 16-foot crossbar. The two wires on the crossbar were wired negative and positive, and were bared alternately every 38 inches. To each of the bared areas was soldered a 6-foot section No. 9 braided copper wire with 3/4-pound of lead affixed to the end. The braided wires served as the electrodes. Male and female plug-ins were wired between the side boom and the crosspiece.

Three men operated this unit. One operated the boat and controlled the amount of current flowing to the electrodes: The other two men worked between the railing on the forward platform, netting the fish as they became immobilized. The unit was operated downstream so that the water current would not sweep the immobilized fish out of reach. This also minimized the amount of water resistance on the electrodes; thus the electrodes hung more perpendicular and reached deeper water.

This unit was later modified by discarding the braided wire electrodes and using 6-foot sections of 3/8-inch flexible conduit with 3/4-pound of lead in the end for weight. Clamps were soldered to the bared areas on the crosspiece for easy removal of the electrodes. The A.C. boom shocker was operated under as many varied conditions of light, depth, current speed and bottom cover as possible and most of the different types of habitat were sampled.

The species composition of the fish in the Chena River has not been determined. However, the frequency of occurrence of each species of fish in the total number taken by A.C. electro-fishing is listed.

The grayling and whitefish utilized for the age and sex composition phase of the study were measured to the nearest millimeter and sexed by direct examination of the gonads. All fish were recorded as either mature or immature based on the condition of the gonads. Scale samples were taken from the left side of the fish below the dorsal fin. Scale samples were collected from all pike captured; however, no pike were examined for sex information.

All grayling and pike over 152 mm were tagged with the FT-2 dart tag (Flag Tag Manufacturing Co.). These fish were taken by electro-fishing and were measured, scale sampled, and tagged while in the temporary state of immobility induced by the unit. The right ventral fin was clipped from tagged fish to assess tag loss. The date, tag number, and location of each capture was recorded. Upon recapturing the marked fish, location, tag number and fork length were recorded.

The spawning locations of grayling, pike, and whitefish were sought by investigating locations that seemed to possess suitable spawning conditions. Salmon spawning areas were located by utilizing Fish and Wildlife Service data from past years and by surveying likely areas with canoe and riverboat.

A creel census program was conducted on the Chena River with the cooperation of the Protection Division, the Fish and Wildlife Service and Air Force personnel. Periodic counts of fishermen were conducted throughout the fishing season and the exact time spent on each count was recorded.

The total number of fishermen was calculated by the following formula:

$$\frac{\text{Fishermen Counted}}{\text{Time Observed}} = \frac{\text{Total Fishermen}}{\text{Total Fishing Period}}$$

The total fishing period is defined as the days in the months that weather conditions permitted fishing, multiplied by the hours per day that anglers were observed fishing. The total angler hours was determined by multiplying the calculated number of fishermen by the average time fished. A fishermen check-out station at mile 26 on the Chena Hot Springs Road was used to establish the average time fished.

Creel census efforts were directed to those areas having the best access to the river, i.e., Chena Hot Springs Road, Badger Slough, Bailey Bridge area, and the Fort Wainwright area.

FINDINGS

This project was initiated to establish techniques for a pre-impoundment study of the fish populations of the Chena River. A flood control plan has been proposed for this river which, if constructed, would alter the river considerably. A knowledge of the present fish population is essential to assess the effects of this proposed impoundment and to recommend future management of the river.

Description of the Study Area

The Chena River drains the hills east and northeast of Fairbanks, meanders approximately 20 miles across the Tanana River flood plain and empties into the Tanana River 7 miles below Fairbanks. The total length of the river approaches 150 miles and it drains an area of 1,980 square miles. It is essentially a clearwater stream in that the bulk of its water comes from tributaries which drain the surrounding hillsides and from ground water inflow. Effluents from domestic sources, arising primarily from the Fairbanks and Fort Wainwright area, are the major sources of pollutants to the river. Mining operations on the south and east forks, construction efforts on the Chena Hot Springs Road, and natural scouring also account for many basic changes in physical and chemical composition of the river.

The maximum measured flow of the Chena is 74,400 second-feet and the minimum flow has been recorded as low as 200 second-feet. Figure 3 shows flow data for the Chena River for the years 1962-67 as determined by the U.S. Geological Survey (Personal communication, Hydraulic Engineer, Larry Leveen, November 28, 1967, U.S. Department of the Interior).

The bottom materials of the Chena are composed primarily of sand, gravel (1/4" to 3") and areas of large rubble, particularly in upstream sections. Silt deposits occur in the lower reaches of the river and in areas of slow moving water.

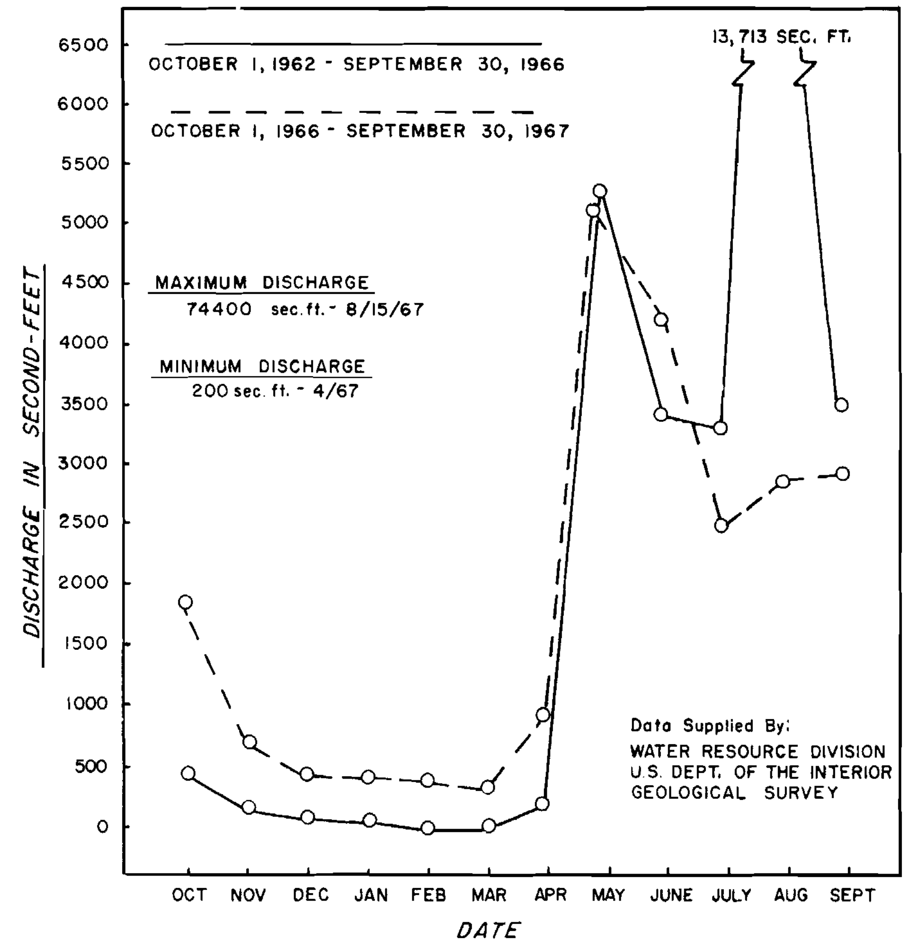

FIGURE 3. AVERAGE DISCHARGE, IN SECOND-FEET, OF THE CHENA RIVER, OCTOBER 1, 1962 - SEPTEMBER 30, 1967, FAIRBANKS, ALASKA.

The macro-fauna of the river includes the following species of fish:

Arctic Grayling	*Thymallus arcticus* (Pallas)
Broad White Fish	*Coregonus nasus* (Pallas)
Brook Lamprey	*Lampetta lamottei*
Burbot	*Lota lota* (Linnaeus)
King Salmon	*Oncorhynchus tshawytscha* (Walbaum)
Chum Salmon	*Oncorhynchus keta* (Walbaum)
Least Cisco	*Coregonus sardinella* (Vuleuciennes)
Northern Pike	*Esox lucius* (Linnaeus)
Northern Sucker	*Catostomus catostomus* (Forster)
Round Whitefish	*Prosopium cylindraceum* (Pallas)
Slimy Sculpin	*Cottus cognatus* (Richardson)

Inconnu *Stenodus leucichthys* (Guldenstadt), and lake chub *Hybopsis plumbea* (Agassiz) have been reported in the Chena River, but were not encountered in this study.

Fish Sampling

Hook and Line:

Table 1 is a summary of the total catch from one ice shanty at river mile 25.

TABLE 1 - Fish Catch by Hook and Line from a Single Ice Shanty by by Two Anglers, 1967.

Time Fished	54 hours
Grayling caught	435
Whitefish	15
Suckers	2
Average catch	8.35 fish per hour

Grayling concentrated in schools below this ice shanty and were readily collected. Hook and line sampling was very efficient for grayling but not efficient enough on the other species to continue its use.

Seine:

Due to the swiftness of the water in the Chena River proper and the occurrence of rocks and snags it was not possible to collect many fish over 150 mm in length by seine. Seining in the backwaters and sloughs yielded sculpins, suckers, and age class O, I, II, and III grayling and whitefish.

Electro-fishing:

Results of sampling with the back-pack electro-shocker are expressed in Table 2.

TABLE 2 - Summary of Back-Pack Electro-Fishing on the Chena River, 1967.

Hours current flowed	1.5
Total fish taken	47
Percent grayling	48.9
Mean length of grayling	65 mm - 277 mm
Grayling per hour	15.3
Fish per hour	31.3

Other fish captured with this unit included whitefish, suckers, and sculpin. The shocker worked well in enclosed areas but would not effectively take fish in areas of deep, open water. The enclosed areas harbored mostly fingerling size fish.

The boat-mounted D.C. unit (Figure 2) was worked both upstream and downstream for approximately 10 hours without collecting fish. Using 200 - 250 volts and pulsing from 50 - 95 times per second, the unit would attract fish. The fish, however, were erratic in behavior. They would come quickly to the anode, but would break away and dash for cover. This behavior is consistent with that found by Haskell and Adelman (1955) when their current was pulsed too rapidly. Lowering the voltages and pulse frequencies, in our case, had no noticeable effect upon the fish. It was decided to abandon this method temporarily and to try collecting the fish with an A.C. boom shocker.

Table 3 shows the results obtained with the A.C. boom shocker (Figure 2) on the Chena River.

TABLE 3 - Summary of Electro-Fishing Results with A.C. Boom Shocker on the Chena River, 1967.

Hours current flowed	42.9
Total fish taken	1,385
Percent grayling	36.1
Mean length grayling	232.6 mm
Length range grayling	65 mm - 340 mm
Grayling per hour	11.7
Fish per hour	32.3

Fish populations in the Chena River can be sampled with electro-fishing devices as indicated by Tables 2 and 3 with the back-pack shocker best suited for capturing smaller fish in shallow backwater areas and the boom shocker more efficient for larger fish in areas of deeper water and swifter current.

To effectively take fingerling and smaller fish with either unit, however, requires voltages of such magnitude that large fish encountered may be injured. Thus, quantitative studies of fingerling size fish captured by electro-fishing should be approached with caution. Studies by Haskell and Zilliox (1940) on known populations of trout have shown that electro-fishing was efficient for qualitative and quantitative studies of larger fish, but good only for qualitative studies of smaller fish.

The average number of fish captured per hour as shown in Table 3 is not indicative of the fishing success which can be expected of the A.C. boom shocker. As the field season progressed the crew became more proficient in operating the shocker, and incorporated modifications to it which improved

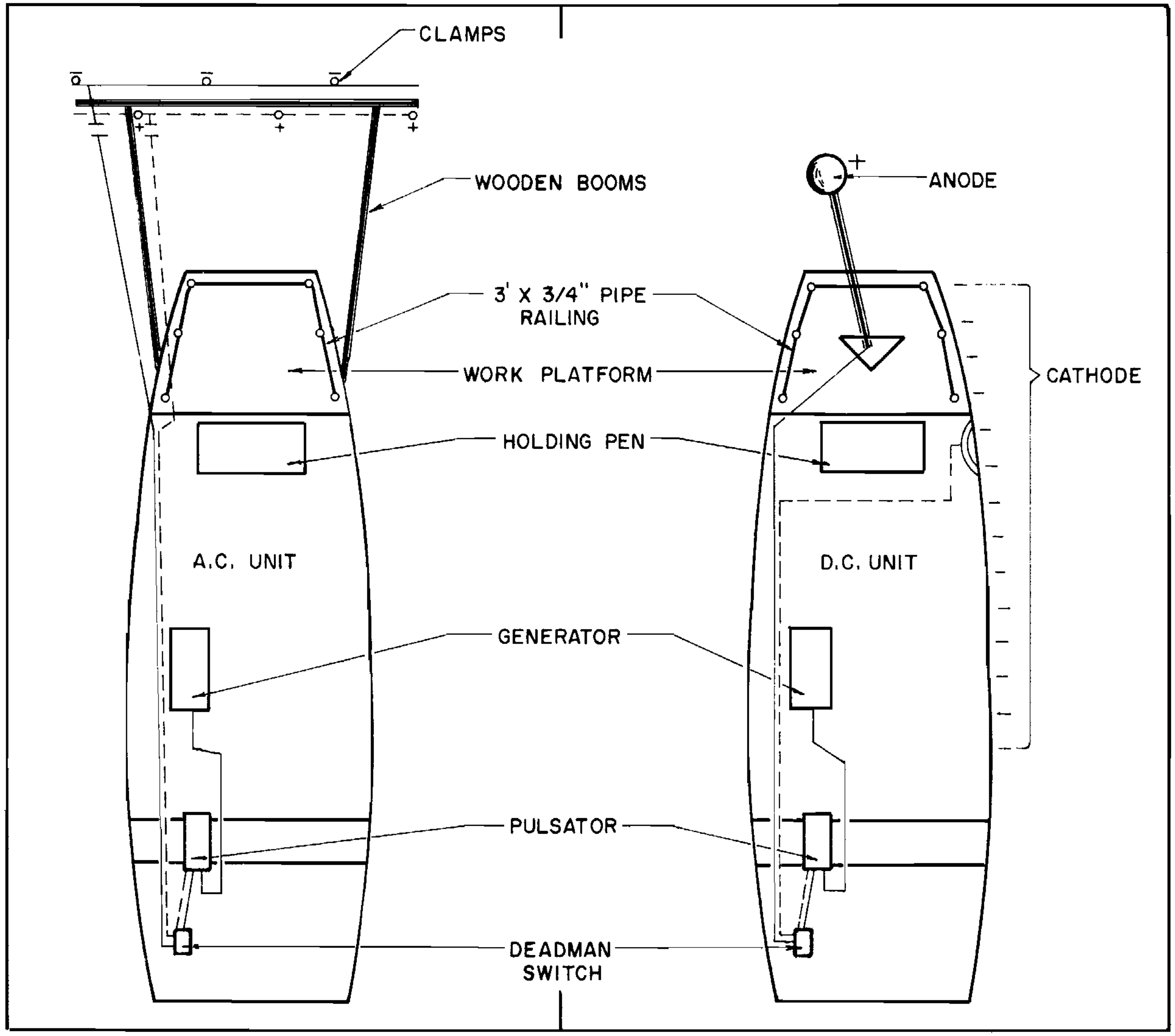

FIGURE 2. BOAT MOUNTED A.C. BOOM SHOCKER AND D.C. UNIT FISHED IN THE CHENA RIVER, 1967.

its overall efficiency. Before the pulsator unit was damaged in early August, it was possible to capture up to 150 fish per hour in the Chena River. In a one-hour period, 235 grayling were captured in the Goodpaster River with the boom shocker. The emphasis in the Goodpaster River study was on grayling only, although many other fish were also immobilized.

Estimated mortality with the A.C. boom shocker was 2.5 - 3-0 percent. The total mortality for all fish including those captured, tagged, measured and scale sampled, plus the fish which were immobilized but uncaptured, may approximate 5 percent. Refinement of techniques could reduce the above mortality considerably.

Species Composition

It is potentially possible to calculate the actual species composition of the fish in the Chena River by using data collected with the A.C. boom shocker. Data are lacking concerning the voltage thresholds for different sizes and species of fish present in the river and on the varying electrical resistivity of the river by area and time. Time and economic considerations prohibited the collection of these data, and the benefit-cost ratio should be considered before an investigation is attempted.

The frequency of occurrence of one or more species in a large sample might be considered an approximation of its actual abundance in the stream, provided that the variables be considered. Table 4 shows the frequency of occurrence of each species in the total (1,432) fish captured with the back-pack shocker and the A.C. boom shocker.

TABLE 4 - Frequency of Occurrence of Fish Taken from the Chena River by A.C. Boom Shocker and Back-Pack Shocker, 1967.

Species	No. Captured	Frequency of Occurrence
Grayling	520	36.3%
Whitefish	529	36.9%
Sucker	321	22.5%
Pike	6	.4%
Burbot	4	.3%
Sculpin	46	3.2%
King Salmon*	6	.4%
Total	1,432	

*Adult King Salmon were just beginning to enter the river during the electro-fishing operations and adult chum salmon were not present during the sampling period.

Movements and Spawning Locations

Three hundred and three grayling and six northern pike were tagged in the Chena River. Eleven tagged grayling (3.1 percent) were recovered and returned by anglers. No tagged northern pike were recovered. Table 5 presents the grayling tag and recovery data.

TABLE 5 - Movements of Tagged Grayling in the Chena River - 1967.

Tag No.	Tagged Date	Tagged Location	Recovered Date	Recovered Location	No. Days Released	Direction Movement	App. No. Miles Traveled
1	4-14-67	VI	5-2-67	VI	18	--	--
16	6-10-67	XIV	7-15-67	XIII	29	down	7
21	"	XII	6-25-67	X	9	down	5
31	"	XIII	7-16-67	XIII	30	--	--
32	"	"	7-16-67	XIII	30	--	--
41	"	XI	7-3-67	X	17	down	10
90	6-20-67	VI	8-1-67	V	43	down	4
94	"	VI	6-22-67	VI	22	--	--
141	6-21-67	VIII	7-17-67	IX	26	up	11
434	6-22-67	VIII	8-4-67	X	44	up	12
453	6-26-67	X	7-2-67	X	7	--	--

The low number of tag returns fails to reveal conclusive summer movement trends. It can be seen, however, that no substantial movements occurred between the time of tagging and recovery.

Grayling were readily taken by hook and line at river mile 25 on the Chena River from early March until April 14 (ice breakup), and a number of different size classes were seen under the ice during this period. However, it could not be determined whether these fish were part of an early upstream migration or were overwintering in the river. Further efforts should be made to locate possible overwintering locations and to gather information on any transitory population.

King salmon were noted at the mouth of the Chena River in early July. Attempts at counting salmon throughout the summer were rendered impossible by inclement weather and muddied waters. Kogl (1965) estimated that approximately 900 chum and 150 king salmon spawn in the Chena River. The majority of the chum salmon spawn in the old river channel at river mile 58 and 64 mile slough. The remaining chum salmon spawn from the North Fork down to 64-mile slough. Most king salmon spawn in the deeper holes above 64-mile slough. No juvenile salmon were encountered in the Chena River proper. Timing of sampling and natural movements of the fish probably account for this.

It was learned after writing the job description that the Alaska Water Laboratory was starting a program to study the ground water inflow in the Chena River. It was decided to await the availability of this information and use this water inflow data as a guide in locating the potential spawning areas.

The backwater sloughs along the Chena Hot Springs Road and several unnamed creeks in the Fairbanks area were investigated in late May and early June with negative results in locating spawning pike and grayling.

Chen (1965) has reported burbot spawning in the Chena River in February.

Age and Sex Composition

Grayling:

Length, sex and age data from 505 grayling were analyzed. Three hundred and four grayling captured by hook and line, electro-shocker and seine were selected on the basis of size to determine growth and sex composition of the various age classes. Figure 4 plots growth data for these fish and Table 6 shows sex composition and maturity of the various age classes. All age class III and older fish in Table 6 were captured through the ice by hook and line. Examination of these fish revealed that 86 percent of age class IV and all older fish had gonads containing mature sex products, while no age class III fish were mature.

TABLE 6 - Sex Composition of Grayling in the Chena River, 1967.

Age Class	Length Range	Mean Fork Length	Percent Male	Percent Female	Percent Mature	No. In Sample
0	22.9-30.5 mm	25.0	50.0	50.0	00.0	30
I	104 -181 mm	135	51.2	48.8	00.0	41
II	153 -231 mm	186	43.9	56.1	00.0	41
III	213 -270 mm	243	70.6	29.4	00.0	17
IV	232 -306 mm	272	56.9	43.1	86.0	51
V	286 -328 mm	293	63.6	36.4	100.0	77
VI	278 -347 mm	321	62.5	37.5	100.0	32
VII	315 -353 mm	335	80.0	20.0	100.0	15

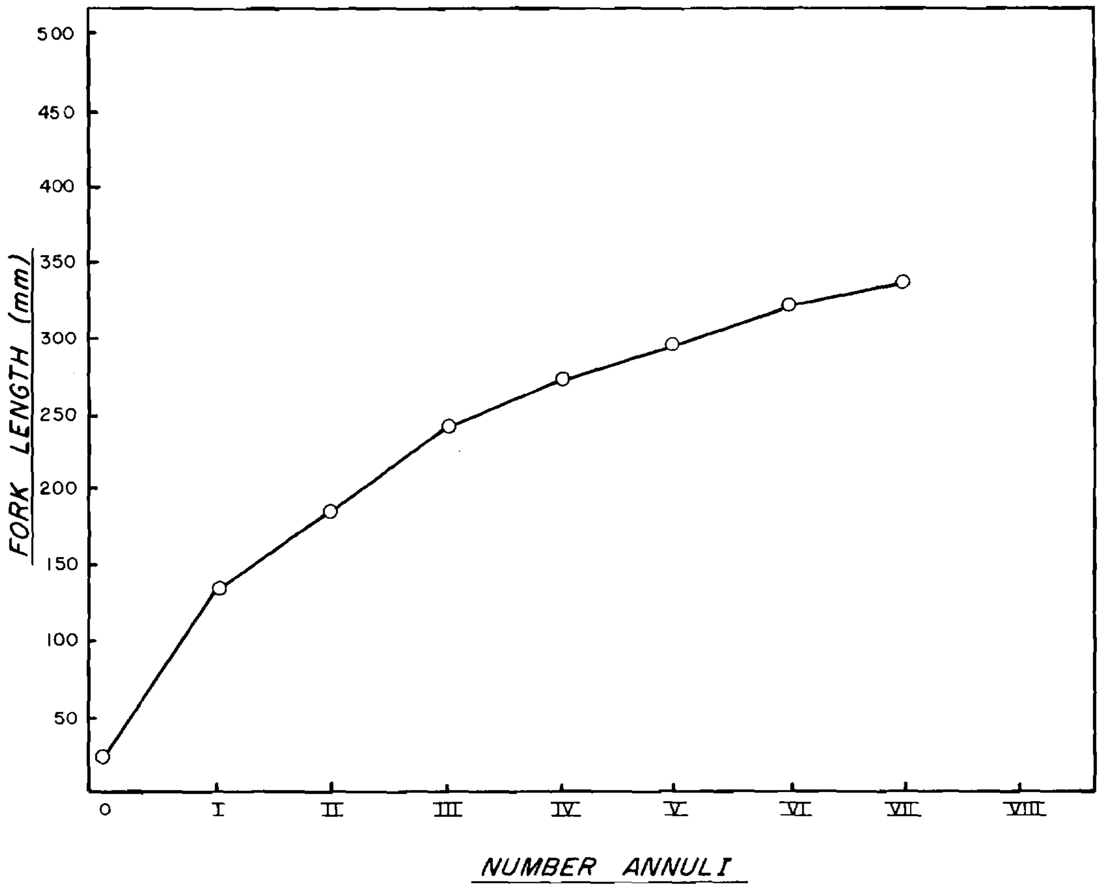

FIGURE 4. AGE AND GROWTH OF 304 GRAYLING, TAKEN BY ELECTROSHOCKER, NET AND HOOK-AND-LINE, CHENA RIVER, 1967.

To determine the age composition of the population, 201 grayling were randomly selected. All of these fish were collected with the A.C. boom shocker except age class 0 grayling which were captured by seine. Figure 5 presents the results of this analysis.

Whitefish:

The 529 whitefish collected consisted of 519 round whitefish, 7 broad whitefish and 3 least cisco. Table 7 presents age composition data and growth information for 103 round whitefish taken from periodic samples during shocking operations. Figure 6 plots the age and growth curve of these same fish.

TABLE 7 - Length and Age Composition of 103 Chena River Round Whitefish, 1967.

Age Class	Length Range (mm)	Mean Length (mm)	No. In Sample	Percent
0	71 - 90	77	11	10.7
I	138 - 187	173	12	11.9
II	200 - 234	217	25	14.5
III	240 - 295	276	40	38.8
IV	277 - 368	312	18	17.4
V	324 - 338	331	2	1.9
VI	352	352	1	1.0
VII	415 - 445	430	2	1.9
VIII	475 - 477	476	2	1.9

Table 8 lists data collected on the broad whitefish captured. No data are presented on cisco and sex data were not collected for whitefish.

TABLE 8 - Age Composition of Chena River Broad Whitefish, 1967.

Age Class	No.	Percent
I	--	--
II	1	14.3
III	--	--
IV	2	28.6
V	1	14.3
VI	3	42.8

Northern Pike:

Due to the low number of pike captured (six) no estimate of the age and sex composition can be made at this time. These pike ranged in length from 200 to 650 mm. The small number of pike captured is probably indicative of a low resident population, inefficient sampling techniques or seasonal behavior patterns.

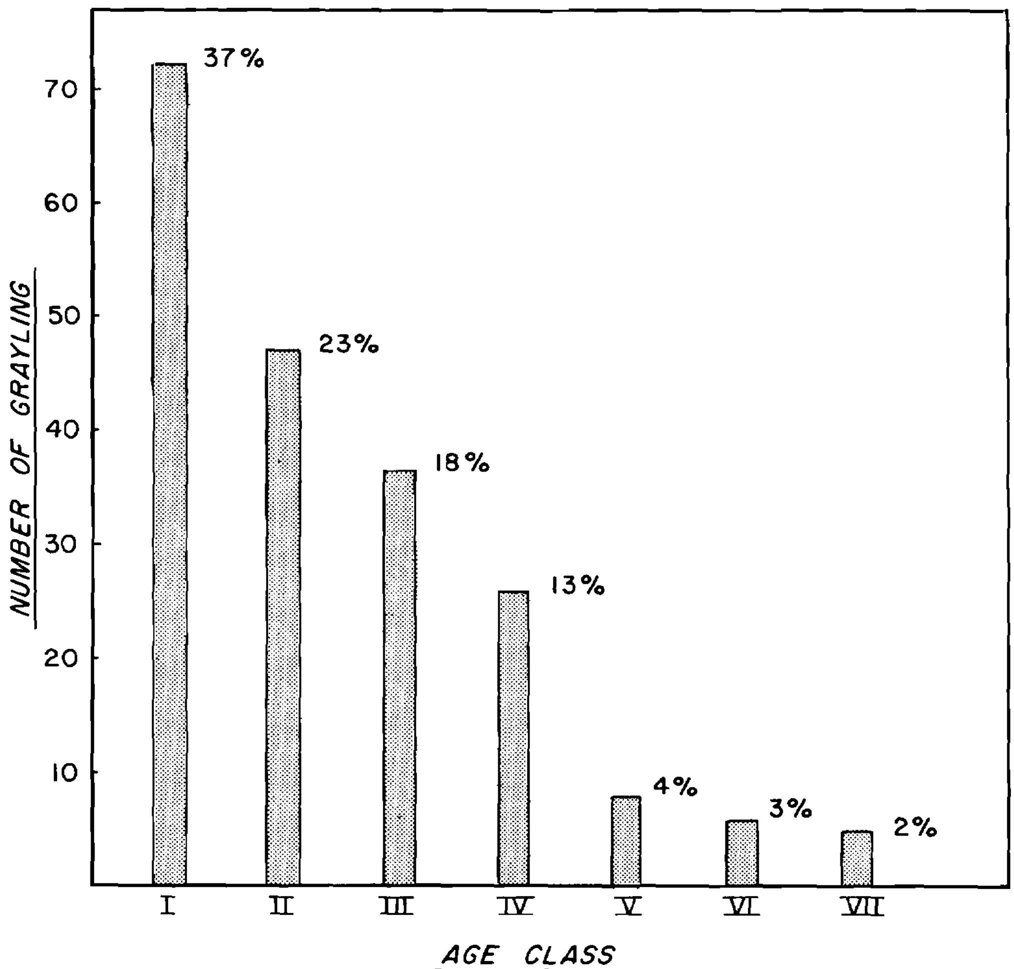

FIGURE 5. AGE COMPOSITION OF 201 ARCTIC GRAYLING COLLECTED BY A.C. BOOM-SHOCKER FROM THE CHENA RIVER, JUNE-AUGUST, 1967.

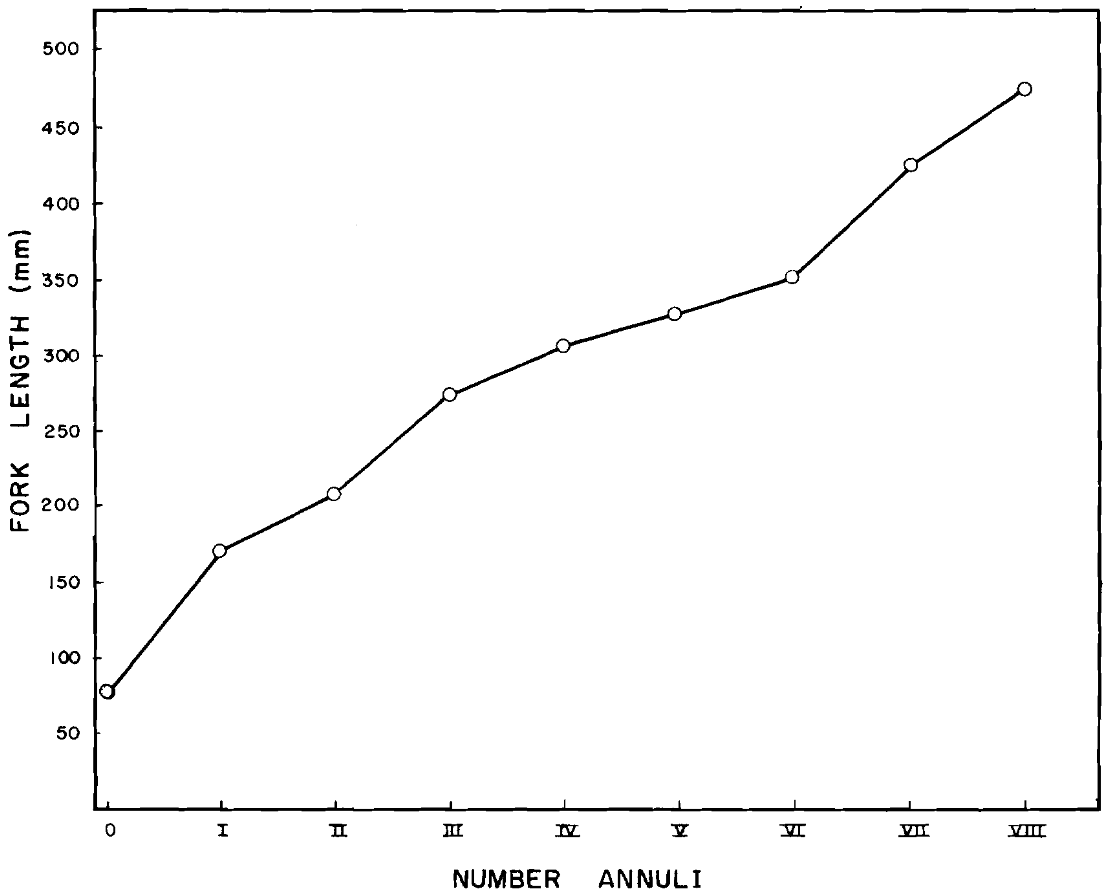

FIGURE 6. AGE AND GROWTH OF 103 ROUND WHITEFISH TAKEN BY ELECTROSHOCKER, CHENA RIVER, 1967.

Angler Utilization

The creel census program conducted from April 10 to August 11, 1967 calculated 8,085 angler days for the Chena Hot Springs Road and the Badger Slough areas.

TABLE 8 - Creel Census Results on the Chena Hot Springs Road and Badger Slough, April 10 - August 11, 1967.

Fishermen counted	1,684
Fishermen interviewed	994
Observed grayling catch	650
Hours interviewed anglers had fished	2,028
Grayling per angling hour	0.32
Calculated angler days	8,085

Angler counts could not be totally randomized because of the necessity to fit some of the counts to the schedules of the cooperating agencies. However, the counts were distributed fairly well over the total fishing period and thus closely represent average angler usage.

Three flights were made to correlate ground fishermen counts with the actual number of fishermen. Approximately 96 percent of the total anglers could be counted from the ground. The remaining 4 percent are included in the estimates of fishing pressure for other areas of the river. The high percentage of anglers which could be counted from the ground was possible because:

1. Posted property along much of the Badger Slough restricted anglers largely to areas adjacent to the Badger Road.

2. Most anglers in the Chena Hot Springs Road area fished near their parked cars and could easily be located. Very few used boats for their fishing.

Table 9 incorporates data from Table 8 together with Sport Fish personnel observations. The data turned in by the military installations were incomplete and therefore not used.

TABLE 9 - Angler Days Fished, by Area, 1967.

Area	Angler Days
Chena Hot Springs Road 26-39 Mile	3,900 - calculated
Badger Slough	4,185 - calculated
Baily Bridge Area	1,000 - estimated
Fort Wainwright Area	3,500 - estimated
Fairbanks Area	200 - estimated
Remote Areas (difficult access)	100 - estimated
Total Angler Days	12,885

The purpose of the check station at Mile 26 on the Chena Hot Springs Road was to determine the total time that anglers fished. In June, 24 people stopped at the check-out station and had fished 121 hours, or an average of 5.5 hours each.

In July, 14 people responded and averaged 4.8 hours of fishing per person. No fishermen responded in August. The mean fishing time of these 38 anglers (5.1 hours) was used as the average time fished on the Chena River in the instances when these data were lacking.

Concomitant with creel census interviews, grayling were examined for fin clips and tags. None of the 650 fish examined had been tagged or fin clipped and the efficiency of the FT-2 dart tag on grayling cannot be calculated at this time.

The field work for this project was terminated on August 11 because of extensive flooding of the Chena River.

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